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IN THE CLAIMS:

1. (currently amended) [[An]] A fully implantable nerve stimulation system, comprising:

at least one nerve cuff so configured as to receiving part of a nerve, the nerve cuff having electrodes therein positioned in the vicinity of nerve fibers;

a control unit including:

a power source;

a processor;

at least one signal conditioning circuit so connected to the electrodes of the at least one nerve cuff as to receive signals from the nerve fibers;

at least one stimulation circuit so connected to the electrodes of the at least one nerve cuff as to deliver stimulation pulses to the nerve fibers;

wherein the processor is so configured as to a) selectively activate the at least one signal conditioning circuit in order to detect at least one gait phase transition event and b) activate the at least one stimulation circuit in response to the detection of the at least one gait phase transition event.

2. (previously presented) The implantable nerve stimulation system of claim 1, wherein the at least one signal conditioning circuit includes:

a low input current amplifier;

a rectifier circuit; and

an integrator circuit.

3. (previously presented) The implantable nerve stimulation system of claim 2, wherein the nerve stimulation system stimulates nerve fibers to treat foot drop and wherein the gait phase transition event includes the occurrence of a heel contact or toe lift event.

4. (previously presented) The implantable nerve stimulation system of claim 3, wherein the processor is so configured as to activate the at least one stimulation circuit in response to the detection of a toe lift event.

5. (previously presented) The implantable nerve stimulation system of claim 3, wherein the processor disables the at least one signal conditioning circuits during at least a portion of the time when the at least one stimulation circuit is activated.

6. (previously presented) The implantable nerve stimulation system of claim 1, wherein the control unit further includes a thigh orientation determination circuit in communication with the processor, the a thigh orientation determination circuit producing a signal indicative of an orientation of a patient's thigh, and wherein the processor disables components of the control unit when the signal indicative of the orientation of the patient's thigh indicates that the patient's thigh is substantially horizontal.

7. (previously presented) The implantable nerve stimulation system of claim 6, wherein the processor is so configured as to adjust the delivered stimulation pulses as a function of the orientation of the patient's thigh.

8. (previously cancelled)

9. (previously presented) The implantable nerve stimulation system of claim 3, wherein the processor is so configured as to detect the occurrence of a heel contact or toe lift event by filtering output signals produced by the at least one signal conditioning circuit and comparing the filtered output signals with the unfiltered output signals to detect a rising or falling ramp in the output signals and wherein the processor activates the at least one stimulation circuit so as to

cause at least one stimulation pulse to be delivered to the nerve fibers upon detection of a toe lift event.

10. (previously presented) The implantable nerve stimulation system of claim 9, wherein the control unit further includes a thigh orientation determination circuit in communication with the processor, the thigh orientation determination circuit producing a signal indicative of the angle of a patient's thigh, and wherein the processor is so configured as to adjust the stimulation pulses delivered by the at least one stimulation circuit in response to the angle of the patient's thigh.

11. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to terminate the activation of the at least one stimulation circuit upon detection of a heel contact event if the signal indicative of the patient's thigh angle indicates the patient is walking on a relatively flat surface.

12. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to terminate the activation of the at least one stimulation circuit upon detection of a second toe lift event if the signal indicative of the patient's thigh angle indicates the patient is walking on a stair.

13. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to increase the magnitude of the stimulation pulses delivered by the stimulation circuit if the signal indicative of the patient's thigh angle indicates the patient is walking up a stair.

14. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to decrease the magnitude of the stimulation pulses delivered by the stimulation circuit if the signal indicative of the patient's thigh angle indicates that the patient is walking down a stair.

15. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to reduce the power drawn from the power source if the signal indicative of the angle of the patient's thigh indicates the patient is not standing.

16. (previously presented) The implantable nerve stimulation system of claim 9, wherein the at least one nerve cuff includes a first nerve cuff so configured as to receive part of the tibial nerve and a second nerve cuff so configured as to receive part of the common peroneal nerve.

17. (previously presented) The implantable nerve stimulation system of claim 9, wherein the at least one nerve cuff includes a nerve cuff so configured as to receive part of the common peroneal nerve.

18. (previously presented) The implantable nerve stimulation system of claim 9, wherein the at least one nerve cuff includes a nerve cuff so configured as to receive part of the sciatic nerve.

19. (previously cancelled)

20. (previously presented) The implantable nerve stimulation system of claim 3, wherein the control unit further comprises:

a thigh orientation determination circuit so configured as to produce signals indicative of the angle of a patient's thigh and wherein the processor is so configured as to adjust the power drawn from the electrical power source in response to the thigh angle.

21. (previously presented) The implantable nerve stimulation system of claim 20, wherein the processor adjusts the stimulation pulse delivered to the electrodes in response to the thigh angle.

22. (previously presented) The implantable nerve stimulation system of claim 3, wherein the control unit further comprises:

a programmable switch so controlled by the processor as to selectively couple one of the at least one signal conditioning circuit to the electrodes of one of the at least one signal conditioning circuit.

23. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to enable the at least one signal conditioning circuit periodically when the signal indicative of the patient's thigh angle indicates the patient's thigh is horizontal.

24. (previously presented) The implantable nerve stimulation system of claim 10, wherein the processor is so configured as to enable the at least one signal conditioning circuit more frequently when the signal indicative of the patient's thigh angle indicates the patient's thigh is vertical.

25. (previously presented) The implantable nerve stimulation system of claim 20, wherein the processor is so configured as to operate in a plurality of modes that are dependent in part on the signal indicative of the angle of the patient's thigh.

26. (previously presented) The implantable nerve stimulation system of claim 25, wherein the processor is so configured as to reduce power drawn from the power source when the signal indicative of the angle of the patient's thigh indicates that the patient's thigh is substantially horizontal.

27. (previously presented) The implantable nerve stimulation system of claim 25, wherein the processor is so configured as to detect heel contact or toe lift events from output signals produced by the at least one signal conditioning circuit when the signal indicative of the angle of the patient's thigh indicates that the patient is standing.

28. (previously presented) The implantable nerve stimulation system of claim 27, wherein the processor is so configured as to detect heel contact or toe lift events from filtered and unfiltered output signals produced by the at least one signal conditioning circuit.

29. (previously presented) The implantable nerve stimulation system of claim 28, wherein the filtered output signals are filtered with a morphological filter.

30. (previously presented) The implantable nerve stimulation system of claim 25, wherein the processor is so configured as to adjust the delivered stimulation pulses as a function of the signal indicative of the angle of the patient's thigh.

31. (previously presented) The implantable nerve stimulation system of claim 1, wherein the power source includes a battery.

32. (previously presented) The implantable nerve stimulation system of claim 31, wherein the battery is rechargeable.

33. (previously presented) The implantable nerve stimulation system of claim 1, wherein the control unit further includes a communication circuit that communicates with an external programmer to adjust the operation of the processor.

34. (previously presented) The implantable nerve stimulation system of claim 33, wherein the external programmer can adjust which electrodes the at least one signal conditioning circuit is connected to, and which electrodes receive the stimulation pulses.

35. (previously presented) The implantable nerve stimulation system of claim 25, wherein the processor is so configured as to disable the at least one signal conditioning circuit when a stimulation pulse is being delivered to the electrodes of one of the at least one nerve cuff.

36. (previously presented) The implantable nerve stimulation system of claim 25, wherein the processor is so configured as to periodically enable the at least one signal conditioning circuit wherein the signal indicative of the angle of the patient's thigh indicates that the patient's thigh is substantially horizontal.

37. (previously presented) The implantable nerve stimulation system of claim 1, wherein the nerve stimulation system is so configured as to stimulate a patient's muscle, and wherein the

processor is so configured as to operate in a user initiated exercise mode such that the at least one stimulation circuit is activated for a selectable period of time to exercise the patient's muscle.

38. (previously presented) The implantable nerve stimulation system of claim 1, wherein the processor selectively enables the at least one conditioning circuit and the at least one stimulation circuit so as to lengthen the life of the power source.

39. (currently amended) [[An]] A fully implantable nerve stimulation system, comprising:

at least one nerve cuff so configured as to receiving part of a nerve, the nerve cuff having electrodes therein positioned in the vicinity of nerve fibers;

a control unit including:

a power source;

a processor;

at least one signal conditioning circuit so connected to the electrodes of the at least one nerve cuff as to receive signals from the nerve fibers;

at least one stimulation circuit so connected to the electrodes of the at least one nerve cuff as to deliver stimulation pulses to the nerve fibers;

wherein the processor is so configured as to a) selectively activate the at least one signal conditioning circuit, b) analyse the signals received by the at least one signal conditioning circuit so as to detect either a positive ramp having a duration between a first and a second values and a peak-to-baseline difference greater than a first threshold value or a negative ramp having a duration between a third and a fourth values and a peak-to-baseline difference greater than a second threshold value and c) activate the at least one stimulation circuit in response to the detection of either the positive ramp having a duration between the first and the second values and a peak-to-baseline difference greater than the first threshold value or the negative ramp having a duration

between the third and the fourth values and a peak-to-baseline difference greater than the second threshold value.

40. (previously presented) The implantable nerve stimulation system of claim 39, wherein the first value is 50 ms and the second value is 150 ms.

41. (previously presented) The implantable nerve stimulation system of claim 39, wherein the third value is 150 ms and the fourth value is 300 ms.

42. (previously presented) The implantable nerve stimulation system of claim 6, wherein the thigh orientation determination circuit includes an accelerometer circuit.

43. (previously presented) The implantable nerve stimulation system of claim 42, wherein the thigh accelerometer circuit includes a pair of orthogonally oriented accelerometers.

44. (previously presented) The implantable nerve stimulation system of claim 10, wherein the thigh orientation determination circuit includes an accelerometer circuit.

45. (previously presented) The implantable nerve stimulation system of claim 44, wherein the thigh accelerometer circuit includes a pair of orthogonally oriented accelerometers.

46. (previously presented) The implantable nerve stimulation system of claim 20, wherein the thigh orientation determination circuit includes an accelerometer circuit.

47. (previously presented) The implantable nerve stimulation system of claim 46, wherein the thigh accelerometer circuit includes a pair of orthogonally oriented accelerometers.

48. (previously presented) The implantable nerve stimulation system of claim 1, wherein the processor is further so configured as to process the at least one gait phase transition event in order to determine a patient's gait phase and activate the at least one stimulation circuit in response to the patient's gait phase.

49. (currently amended) [[An]] A fully implantable nerve stimulation system, comprising:

at least one nerve cuff so configured as to receiving part of a nerve, the nerve cuff having electrodes therein positioned in the vicinity of nerve fibers;

a control unit including:

a power source;

a processor;

a thigh orientation determination circuit producing a signal indicative of an orientation of a patient's thigh;

at least one signal conditioning circuit so connected to the electrodes of the at least one nerve cuff as to receive signals from the nerve fibers;

at least one stimulation circuit so connected to the electrodes of the at least one nerve cuff as to deliver stimulation pulses to the nerve fibers;

wherein the processor is so configured as to a) selectively activate the at least one signal conditioning circuit in order to detect a physiological event b) activate the at least one stimulation circuit in response to the detection of the physiological event and c) adjust an output of the at least one stimulation circuit in response to the orientation of the patient's thigh.

50. (previously presented) The implantable nerve stimulation system of claim 49, wherein the at least one signal conditioning circuit includes:

a low input current amplifier;

a rectifier circuit; and

an integrator circuit.

51. (previously presented) The implantable nerve stimulation system of claim 50, wherein the nerve stimulation system stimulates nerve fibers to treat foot drop and wherein the physiological event is the occurrence of a heel contact or toe lift event.

52. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to activate the at least one stimulation circuit in response to the detection of a toe lift event.

53. (previously presented) The implantable nerve stimulation system of claim 52, wherein the processor disables the at least one signal conditioning circuits during at least a portion of the time when the at least one stimulation circuit is activated.

54. (previously presented) The implantable nerve stimulation system of claim 49, wherein the processor disables components of the control unit when the signal indicative of the orientation of the patient's thigh indicates that the patient's thigh is substantially horizontal.

55. (previously presented) The implantable nerve stimulation system of claim 54, wherein the processor is so configured as to adjust the delivered stimulation pulses as a function of the orientation of the patient's thigh.

56. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to detect the occurrence of a heel contact or toe lift event by filtering output signals produced by the at least one signal conditioning circuit and comparing the filtered output signals with the unfiltered output signals to detect a rising or falling ramp in the output signals and wherein the processor activates the at least one stimulation circuit so as to cause at least one stimulation pulse to be delivered to the nerve fibers upon detection of a toe lift event.

57. (previously presented) The implantable nerve stimulation system of claim 49, wherein the thigh orientation determination circuit includes an accelerometer.

58. (previously presented) The implantable nerve stimulation system of claim 57, wherein the thigh accelerometer circuit includes a pair of orthogonally oriented accelerometers.

59. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to terminate the activation of the at least one stimulation circuit upon detection of a heel contact event if the signal indicative of the patient's thigh orientation indicates the patient is walking on a relatively flat surface.

60. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to terminate the activation of the at least one stimulation circuit upon detection of a second toe lift event if the signal indicative of the patient's thigh orientation indicates the patient is walking on a stair.

61. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to increase the magnitude of the stimulation pulses delivered by the stimulation circuit if the signal indicative of the patient's thigh orientation indicates the patient is walking up a stair.

62. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to decrease the magnitude of the stimulation pulses delivered by the stimulation circuit if the signal indicative of the patient's thigh orientation indicates that the patient is walking down a stair.

63. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to reduce the power drawn from the power source if the signal indicative of the orientation of the patient's thigh indicates the patient is not standing.

64. (previously presented) The implantable nerve stimulation system of claim 51, wherein the at least one nerve cuff includes a first nerve cuff so configured as to receive part of the tibial nerve and a second nerve cuff so configured as to receive part of the common peroneal nerve.

65. (previously presented) The implantable nerve stimulation system of claim 51, wherein the at least one nerve cuff includes a nerve cuff so configured as to receive part of the common peroneal nerve.

66. (previously presented) The implantable nerve stimulation system of claim 51, wherein the at least one nerve cuff includes a nerve cuff so configured as to receive part of the sciatic nerve.

67. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to adjust the power drawn from the electrical power source in response to the thigh orientation.

68. (previously presented) The implantable nerve stimulation system of claim 51, wherein the control unit further comprises:

a programmable switch so controlled by the processor as to selectively couple one of the at least one signal conditioning circuit to the electrodes of one of the at least one signal conditioning circuit.

69. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to enable the at least one signal conditioning circuit periodically when the signal indicative of the patient's thigh orientation indicates the patient's thigh is horizontal.

70. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to enable the at least one signal conditioning circuit more frequently when the signal indicative of the patient's thigh orientation indicates the patient's thigh is vertical.

71. (previously presented) The implantable nerve stimulation system of claim 51, wherein the processor is so configured as to operate in a plurality of modes that are dependent in part on the signal indicative of the orientation of the patient's thigh.

72. (previously presented) The implantable nerve stimulation system of claim 71, wherein the processor is so configured as to reduce power drawn from the power source when the signal indicative of the orientation of the patient's thigh indicates that the patient's thigh is substantially horizontal.

73. (previously presented) The implantable nerve stimulation system of claim 71, wherein the processor is so configured as to detect heel contact or toe lift events from output signals produced by the at least one signal conditioning circuit when the signal indicative of the orientation of the patient's thigh indicates that the patient is standing.

74. (previously presented) The implantable nerve stimulation system of claim 73, wherein the processor is so configured as to detect heel contact or toe lift events from filtered and unfiltered output signals produced by the at least one signal conditioning circuit.

75. (previously presented) The implantable nerve stimulation system of claim 74, wherein the filtered output signals are filtered with a morphological filter.

76. (previously presented) The implantable nerve stimulation system of claim 49, wherein the power source includes a battery.

77. (previously presented) The implantable nerve stimulation system of claim 76, wherein the battery is rechargeable.

78. (previously presented) The implantable nerve stimulation system of claim 49, wherein the control unit further includes a communication circuit that communicates with an external programmer to adjust the operation of the processor.

79. (previously presented) The implantable nerve stimulation system of claim 78, wherein the external programmer can adjust which electrodes the at least one signal conditioning circuit is connected to, and which electrodes receive the stimulation pulses.

80. (previously presented) The implantable nerve stimulation system of claim 71, wherein the processor is so configured as to disable the at least one signal conditioning circuit when a stimulation pulse is being delivered to the electrodes of one of the at least one nerve cuff.

81. (previously presented) The implantable nerve stimulation system of claim 71, wherein the processor is so configured as to periodically enable the at least one signal conditioning circuit wherein the signal indicative of the orientation of the patient's thigh indicates that the patient's thigh is substantially horizontal.

82. (previously presented) The implantable nerve stimulation system of claim 49, wherein the nerve stimulation system is so configured as to stimulate a patient's muscle, and wherein the processor is so configured as to operate in a user initiated exercise mode such that the at least one stimulation circuit is activated for a selectable period of time to exercise the patient's muscle.

83. (previously presented) The implantable nerve stimulation system of claim 49, wherein the processor selectively enables the at least one conditioning circuit and the at least one stimulation circuit so as to lengthen the life of the power source.